

# Stocking Rate on Land with Environmental Designations

*An estimation of stocking rate on land designated as either RAMSAR, SAC, SPA or SSSI*

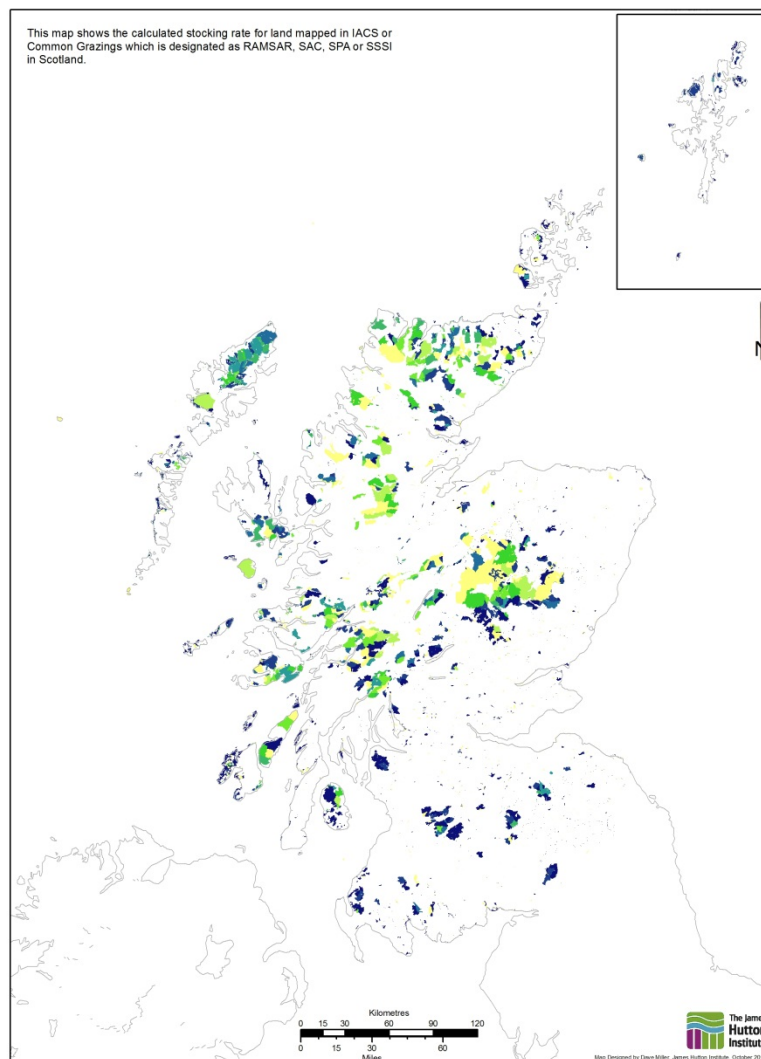
*Dave Miller, Keith Matthews, Willie Towers*



*Analysis provided for the Areas of Natural Constraint Working Group*

*19<sup>th</sup> November 2012 - Version 1.1*

## Stocking Rate for Designated Areas

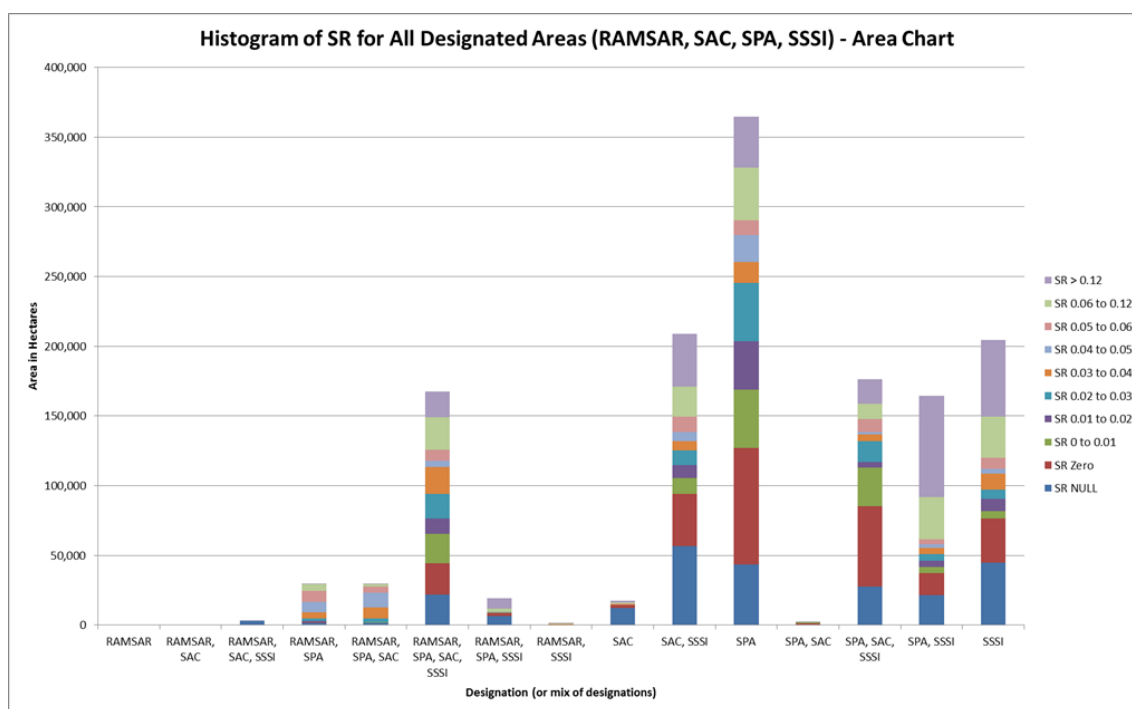


## CONTENTS

EXECUTIVE SUMMARY .....	3
1. Introduction .....	4
2. Datasets .....	4
3. Methodology.....	7
3.1. Calculation of Stocking Rate.....	7
3.2. Combination of Designated Areas .....	8
3.3. Combination of Stocking Rate and Designated Areas .....	9
4. Results.....	10

## EXECUTIVE SUMMARY

The possible introduction of a minimum qualifying stocking rate for future Pillar 1 and 2 support under the new CAP has been raised as a potentially significant issue for land managed under environmental designations. The analysis undertaken here assessed stocking rates for land with a range of environmental designations using land use and livestock data for 2009. For combinations of designations (RAMSAR, SAC, SPA, SSSI), areas for each of ten stocking rate classes were estimated. The figure shows the areas for combinations of environmental designation (the columns) broken down by stocking rate class (the colours within the column). The stocking rates for individual environmental designations are set out in the body of the report but since many designated sites have multiple designations the segmentation by combinations of designations is presented here. It is notable that whatever the combination of environmental designations **the full range of stocking rate classes is present**, though in varying proportions. For the most extensive combinations of designations, **between 50 and 75% of the area has a stocking rate of 0.04 or less depending on the combination of designations.**



Note in this figure “SR Null” refers to land areas which are mapped as having a designation but which have no corresponding area in the stocking rate map. While the analysis cannot be certain of the stocking rate for this area it is likely to be very low or zero since the land area has never claimed direct or agri-environmental payments. For the “SR Zero” class a positive statement can be made that, within the limits of the analysis, the land carries no stock either because of land use, e.g. for the small areas of cropped land or larger areas of woodland present or due to management decisions. With available data it is possible to differentiate the reasons for the zero value for SR if needed. Given the focus of this analysis was on rates of stocking, this differentiation was not included in the reporting.

# 1. INTRODUCTION

This document presents results of an analysis of stocking rate on land with environmental designations. Designations included are RAMSAR wetland sites (RAMSAR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), and Sites of Special Scientific Interest (SSSI). Data on livestock numbers comes from holding level data in the June Agricultural Census (JAC) and December Survey (DS) integrated with land use mapping from the Integrated Administration and Control System (IACS) and from the former Crofters' Commission (CC).

# 2. DATASETS

This analysis combines datasets of three principal types:

- 1) Livestock
- 2) Land Use
- 3) Environmental Designations

Livestock data for sheep, cattle, or deer is derived from the JAC or DS. Land use data comes from IACS claims data or from JAC statistics. Mapping of land use is from IACS with some supplementary mapping of Common Grazings from the former Crofters' Commission. Further descriptions of these data sources may be found in previous project reports available from the authors' Policy Support page<sup>1</sup>.

Data from 2009 was used for two reasons:

- 1) This contains a comprehensive spatial integration of Common Grazing mapping with IACS mapping building on work done previously by the project team.
- 2) Many of the designated sites exist in areas where Common Grazings are prevalent (e.g. Western Isles).

Mapping for Environmental Designations for RAMSAR, SAC, SPA and SSSI sites was obtained from the Scottish Natural Heritage digital gateway<sup>2</sup>. These maps are shown in Figure 1, Figure 2, Figure 3 and Figure 4.

---

<sup>1</sup>[http://www.macaulay.ac.uk/LADSS/research\\_policy.html](http://www.macaulay.ac.uk/LADSS/research_policy.html)

<sup>2</sup>[https://gateway.snh.gov.uk/pls/apex\\_ddtdb2/f?p=101:1:185070079866783](https://gateway.snh.gov.uk/pls/apex_ddtdb2/f?p=101:1:185070079866783)

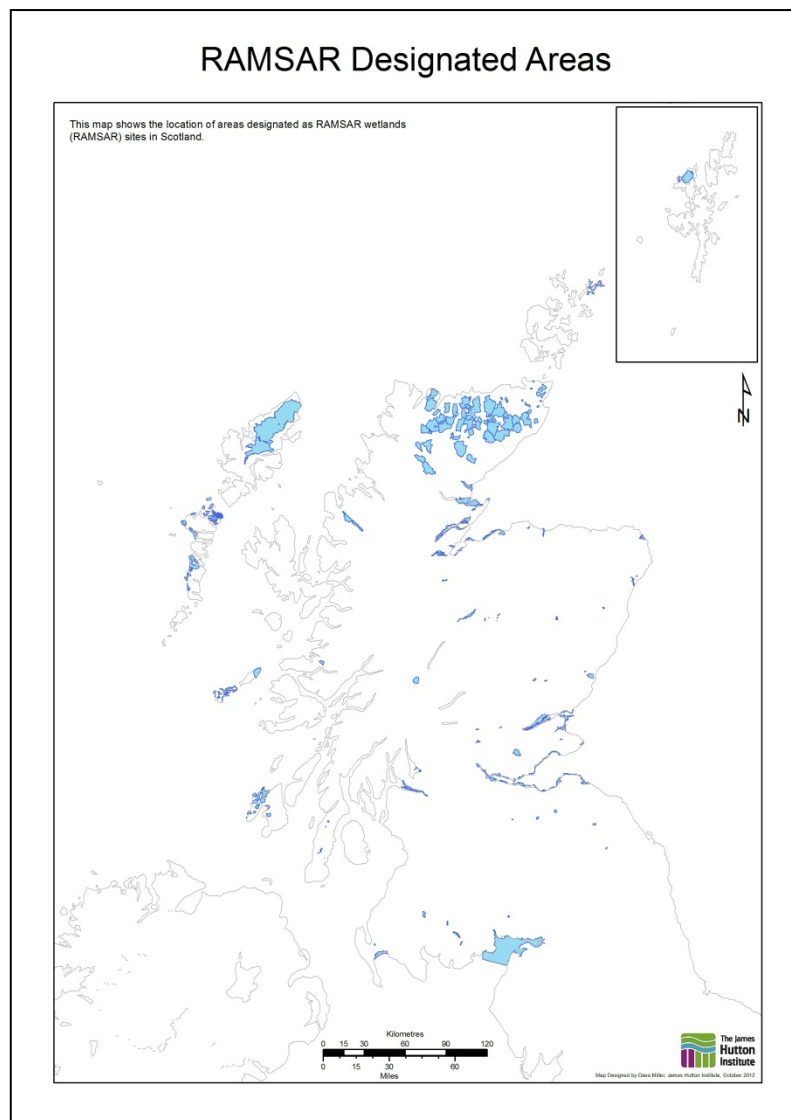


Figure 1: RAMSAR designated sites

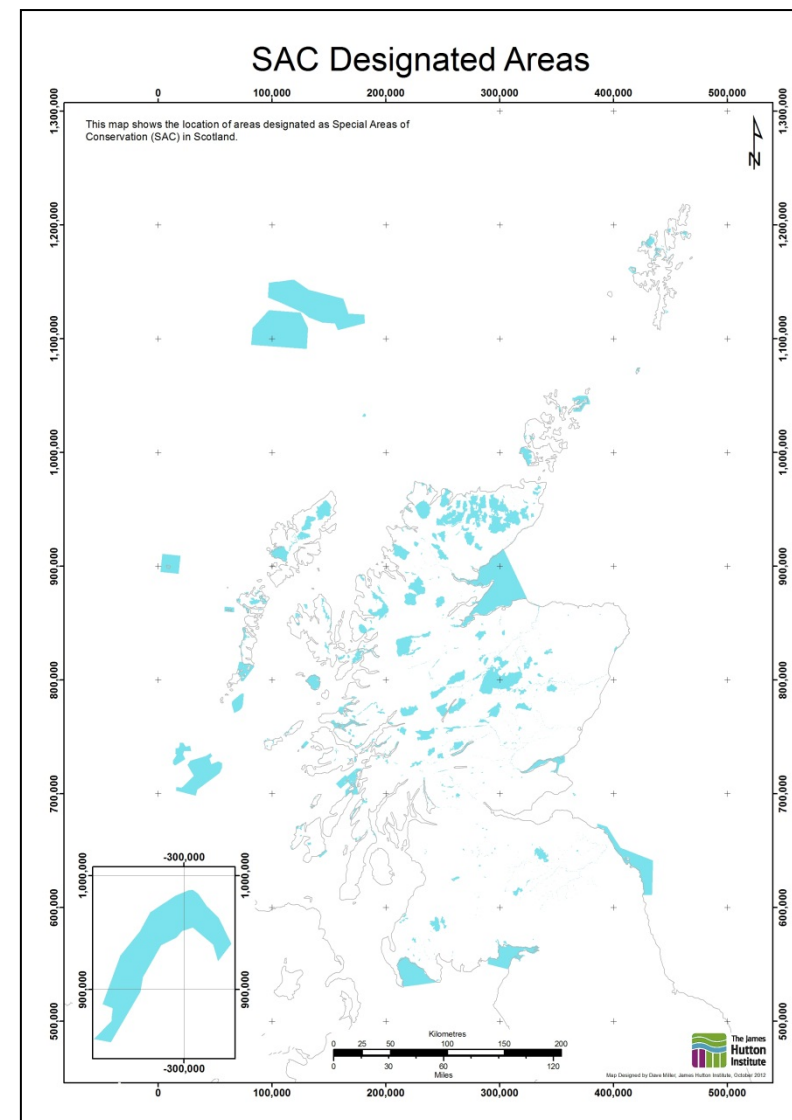


Figure 2: SAC designated sites

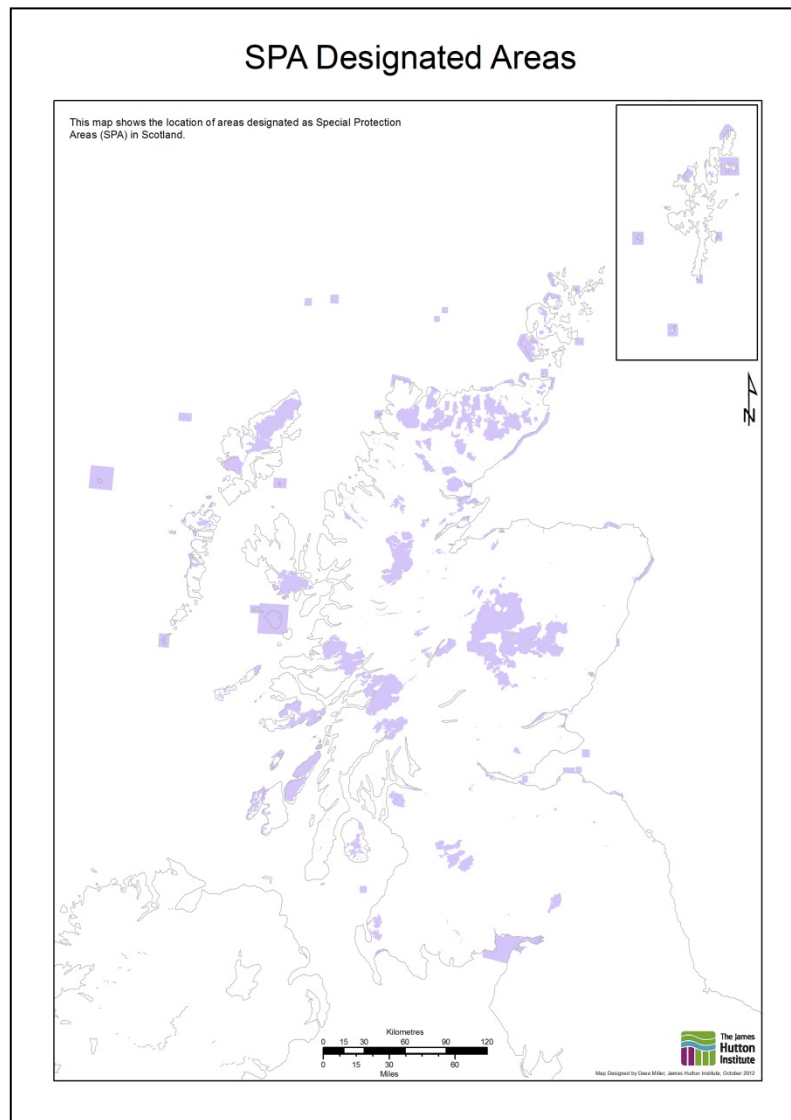


Figure 3: SPA Designated sites

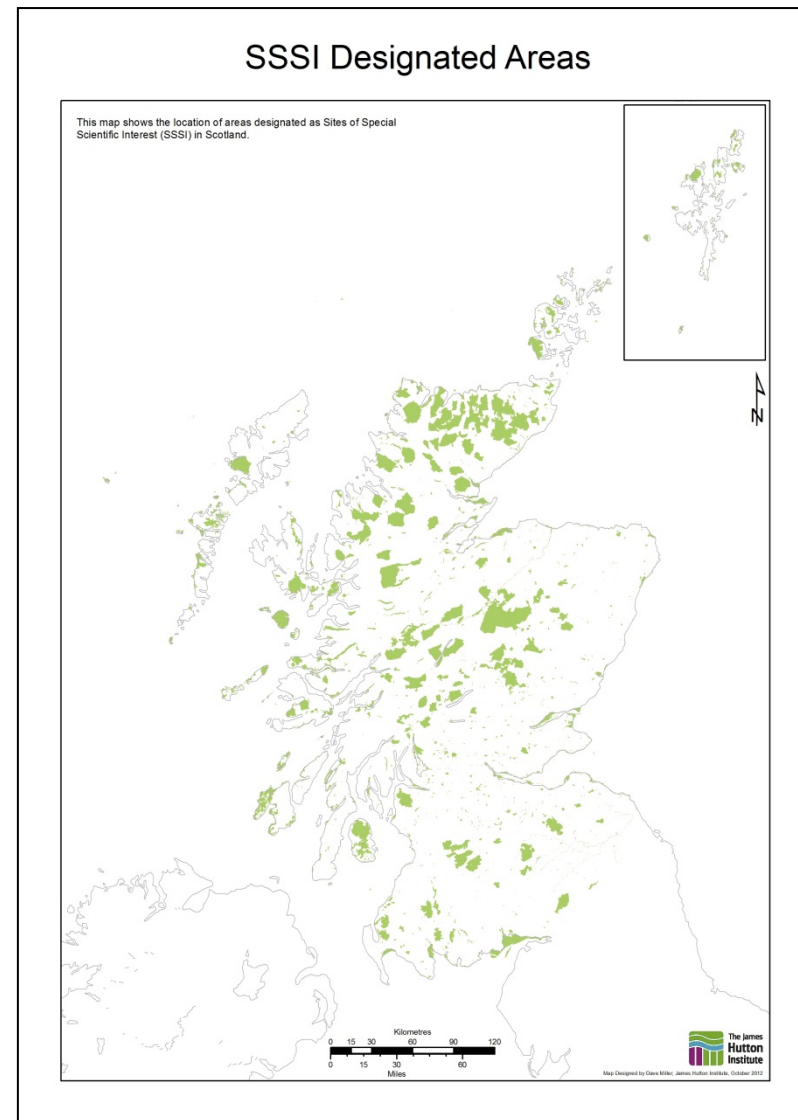


Figure 4: SSSI Designated sites

### 3. METHODOLOGY

#### 3.1. Calculation of Stocking Rate

The calculation of stocking rate used is identical to that used for the modelling work underpinning the Pack Inquiry and other projects<sup>3</sup>. It draws on data from the June Agricultural Census, December Survey, IACS, and the Crofters' Commission, and employs a calculation for livestock units together with land use data obtained either from IACS or from the JAC. Included land uses are: Common Grazing, Rough Grazing, Grass Over 5 Years, Grass Under 5 Years, and Open Woodland (Grazed). The area of included land uses is estimated per holding and accounts for seasonal rental of land (in and out) via the IACS seasonal rental dataset and also for the shared use of land parcels (~2.6M ha) again via IACS data.

Total Livestock Units (LSU) is given by the following formula:

Livestock Units = (Cattle \* Cattle Weighting) + (Sheep \* Sheep Weighting) + (Deer \* Deer Weighting) where:

Cattle Weighting = 1.00 livestock units for all cattle excluding those under 1 year.

Sheep Weighting = 0.12 livestock units for all sheep excluding lambs.

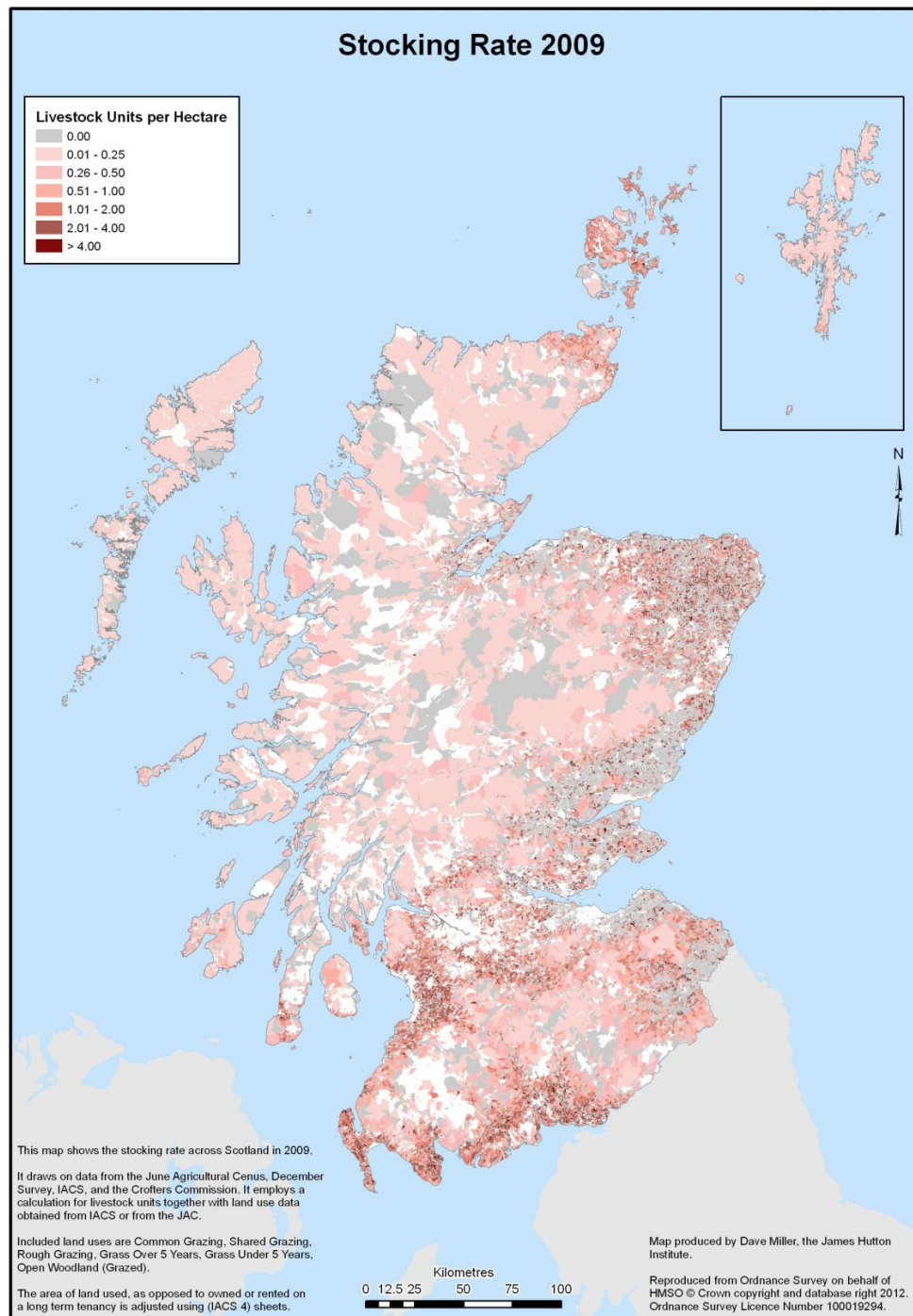
Farmed Deer Weighting = 0.3 livestock units for all deer excluding calves.

The map of the resultant stocking rate layer can be seen in Figure 5. Fields are assigned a zero stocking rate value both where there is no stock present and where the land use is excluded (e.g. arable crops). Otherwise the field is assigned the stocking rate for the holding as a whole except where the field is used by multiple holdings where the stocking rate is the *pro-rata* (by area) combination of the users holding-level stocking rates. In holdings where there is a significant variation in the quality of land available, then a holding level stocking rate is likely to be an overestimate on poor quality land and an underestimate on the better quality. There is, however, currently no definitive basis on which to conduct within holding disaggregation.

---

<sup>3</sup>[http://www.macauley.ac.uk/LADSS/cap\\_flattening.html](http://www.macauley.ac.uk/LADSS/cap_flattening.html)





**Figure 5: Stocking Rate 2009**

### 3.2. Combination of Designated Areas

The GIS data layers for each of the RAMSAR, SAC, SPA, and SSSI designations from the Scottish Natural Heritage 'Natural Spaces' Information portal were pre-processed to remove self-intersections. As these designations are not mutually exclusive, these layers were then combined to create a single layer for all designations and their combinations. A map of this new data layer can be seen in Figure 6.



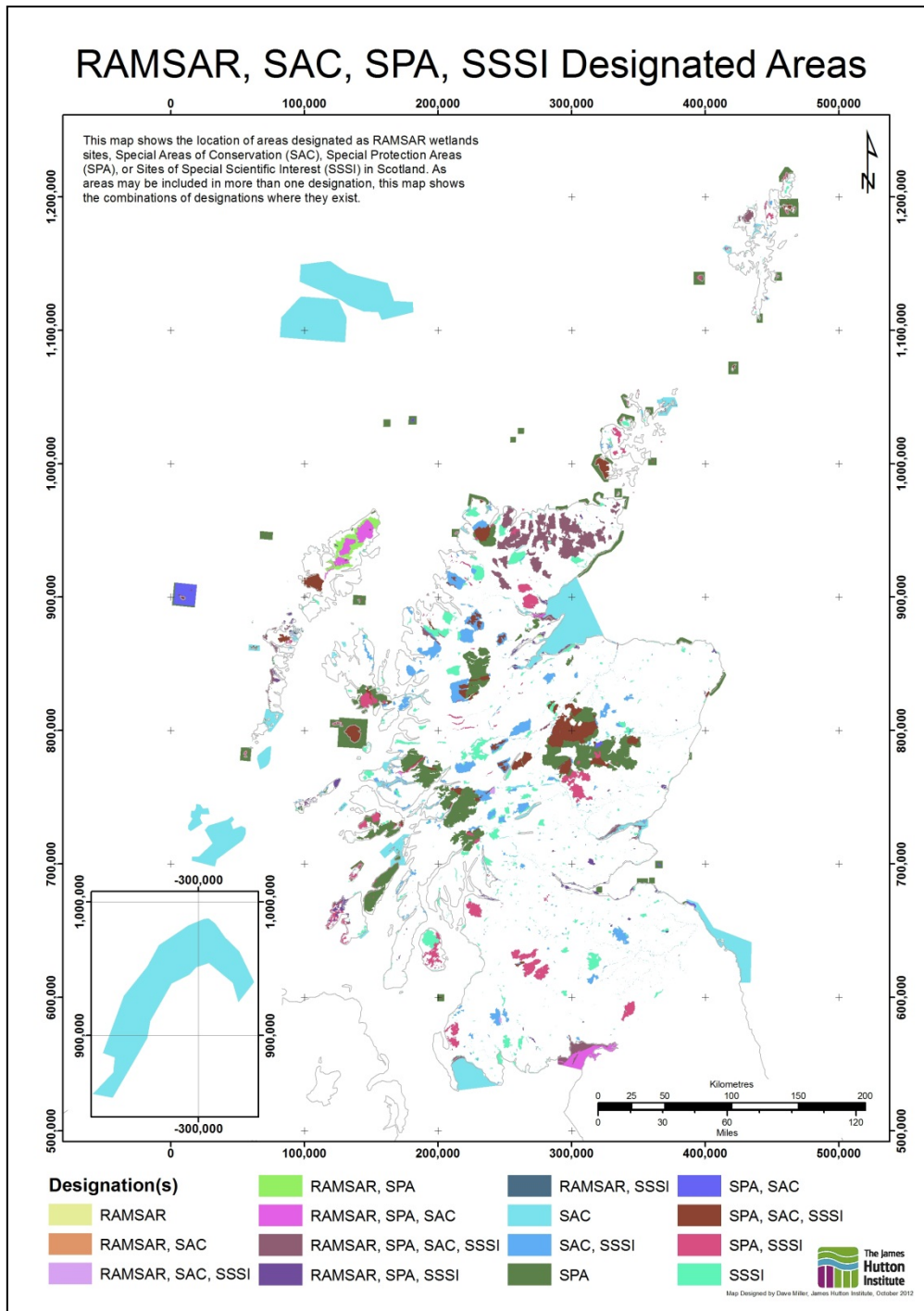


Figure 6: Combination of all designated areas included in the analysis

### 3.3. Combination of Stocking Rate and Designated Areas

The designated areas and stocking rate layers were combined to produce a data layer containing a calculated stocking rate for all combinations of designated areas. Finally this output layer was combined with a representation of the coastline to remove areas of designated areas which lie beyond the Mean High Water (Springs) line in order that results may be reported against land-based designated areas only.

## 4. RESULTS

Figure 7 shows the resultant map of the combination of the stocking rate layer and the combined designated sites layer. Stocking rate is classified into steps of 0.01 up to 0.06 lsu/ha, then a single class of 0.06 to 0.12 lsu/ha, and a final class of > 0.12 lsu/ha. In the histograms which follow this classification is also adopted.

In the histograms shown in Figure 8 to Figure 15, “SR Null” refers to land areas which are mapped as having a designation but which have no corresponding area in the stocking rate map. Some proportion of this “SR Null” land may correspond to the approximately 156 thousand ha of holdings within JAC that have no field boundary data associated with them in the SG field boundary map. The lack of field mapping for these holdings means these areas could not be spatially associated with the maps of the designated areas. While the analysis cannot thus be certain of the stocking rate for this area it is likely to be very low or zero since the land area has never claimed direct or agri-environmental payments. For the “SR Zero” class a positive statement can be made that, within the limits of the analysis, the land carries no stock either because of land use, e.g. for the small areas of cropped land or larger areas of woodland present or due to management decisions. With available data it is possible to differentiate the reasons for the zero value for SR if needed. Given the focus of this analysis was on rates of stocking, this differentiation was not included in the reporting.

Figure 8 shows the histogram of stocking rates across all combinations of designations in area terms while Figure 9 shows the same data expressed as percentages. These two figures show the combinations of the four environmental designations separately. This ensures that there is no double counting when a site has more than one designation.

Figure 10 shows the histogram of stocking rates for each designation in area terms as separate categories in order that comparisons may be more easily made between designations. Figure 11 shows the same data but expressed as percentages. Note that since environmental designations are not mutually exclusive, this representation does contain unavoidable double counting between categories.

Figure 12 shows the histogram of stocking rates for land areas identified as RAMSAR wetlands (i.e. RAMSAR sites only above the Mean Springs High Water Mark tide line) while Figure 13, Figure 14 and Figure 15 show the same histograms for SAC sites, SPA sites and SSSI sites respectively. The combined areas of Figures 12 to 15 again double count when areas have multiple designations, but are accurate reports of areas per SR class for each individual designation.

No detailed interpretation of the results is provided in this report since this was beyond the projects scope. It is useful, however, to note that there are substantial areas of land (615,005) that, while stocked with domestic livestock, would fall below a 0.04 lsu/ha threshold. It is also clear that the actual (and assumed appropriate) stocking rate for designated areas varies widely dependent on their circumstances so any decision on how to treat designated areas should account for this variation. To assist in interpreting the effects of different activity thresholds a figure presenting the areas included by using different stocking rate thresholds is included (Figure 16). This figure shows the decline in the included area with increasing threshold values. For stocking rates greater than 0.04, 531,139 ha of 1,147,165 ha are included (note this does not include the 240,723 ha where no stocking rate could be determined – the SR = null class).

# Stocking Rate for Designated Areas

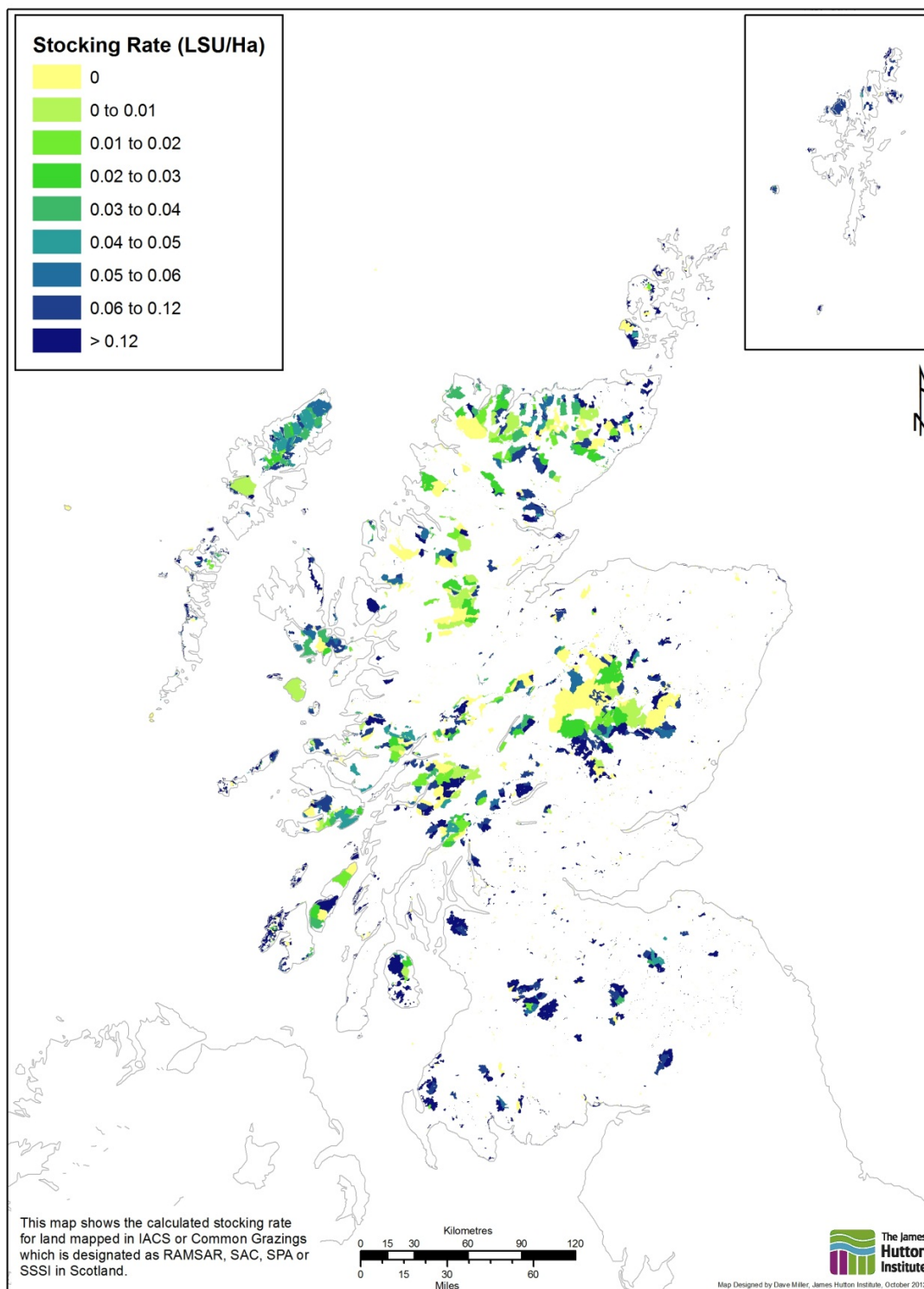


Figure 7: Stocking rate for designated areas

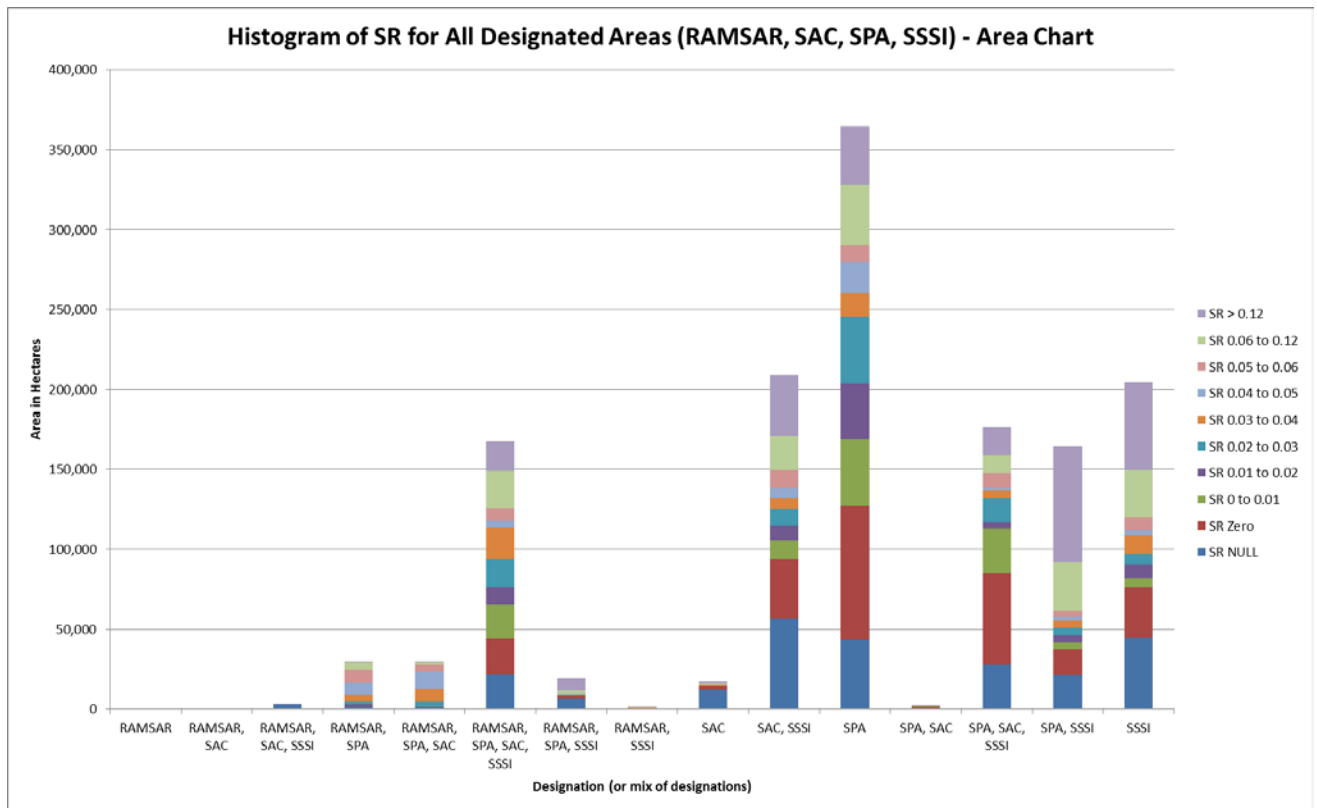


Figure 8: Histogram of SR for All Designated Sites - Area Chart

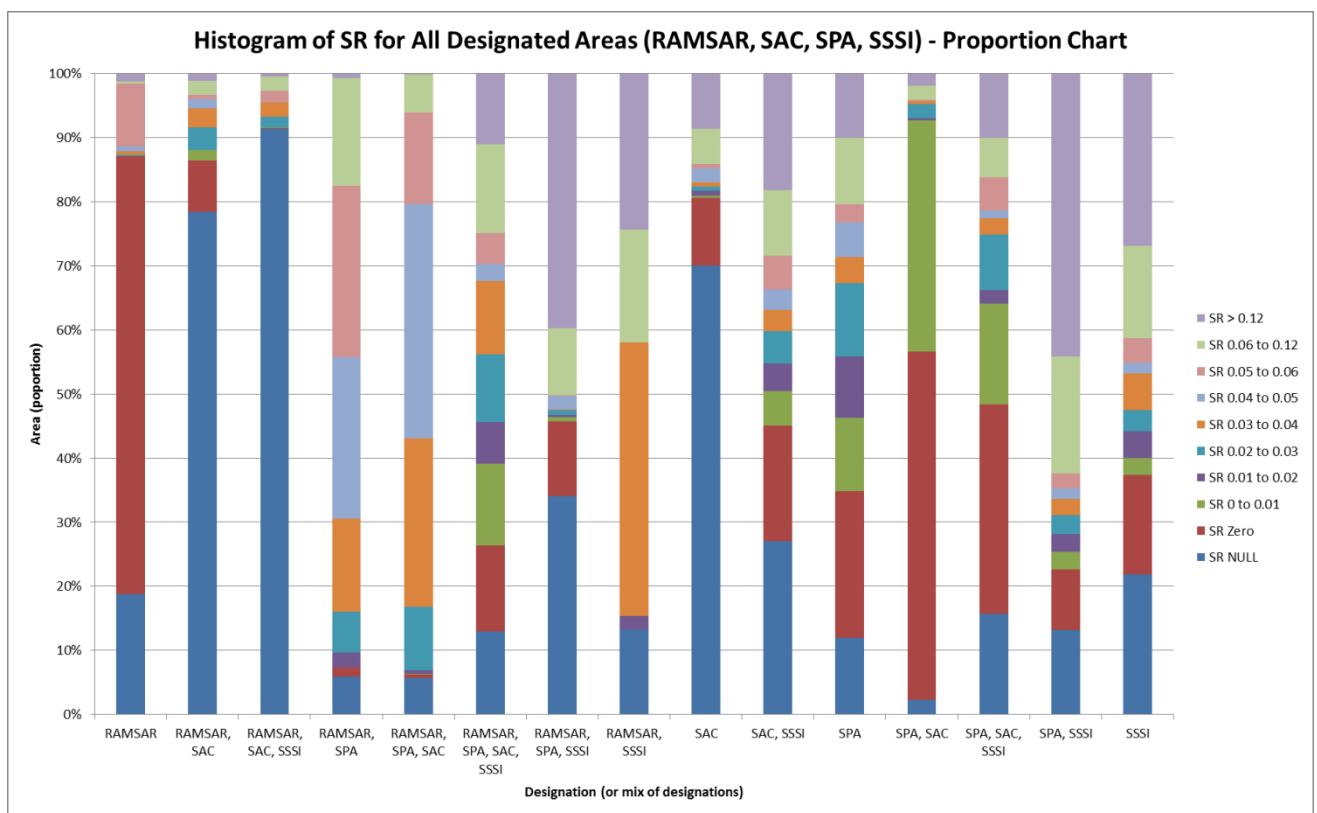


Figure 9: Histogram of SR for All Designated Sites (Proportion Chart)

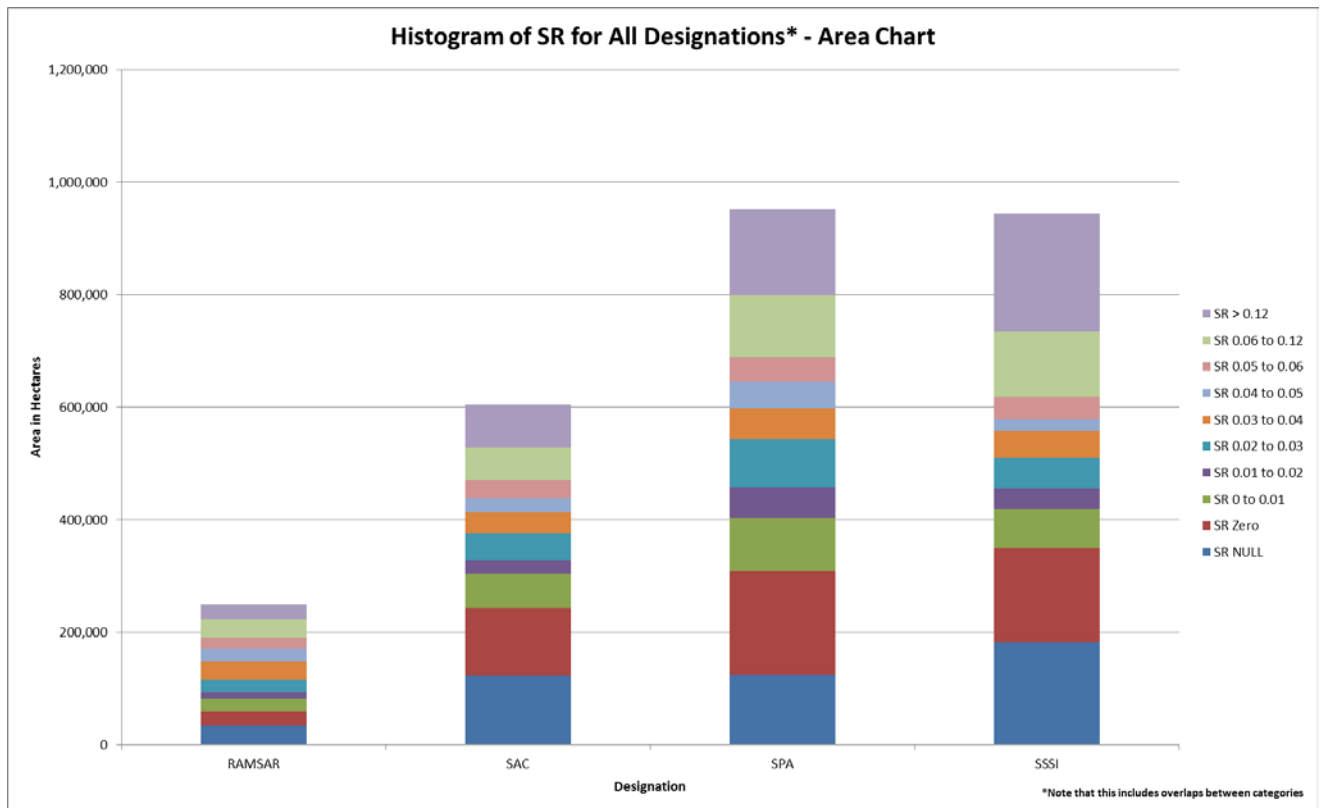


Figure 10: Histogram of SR for all Designations\* - Area Chart

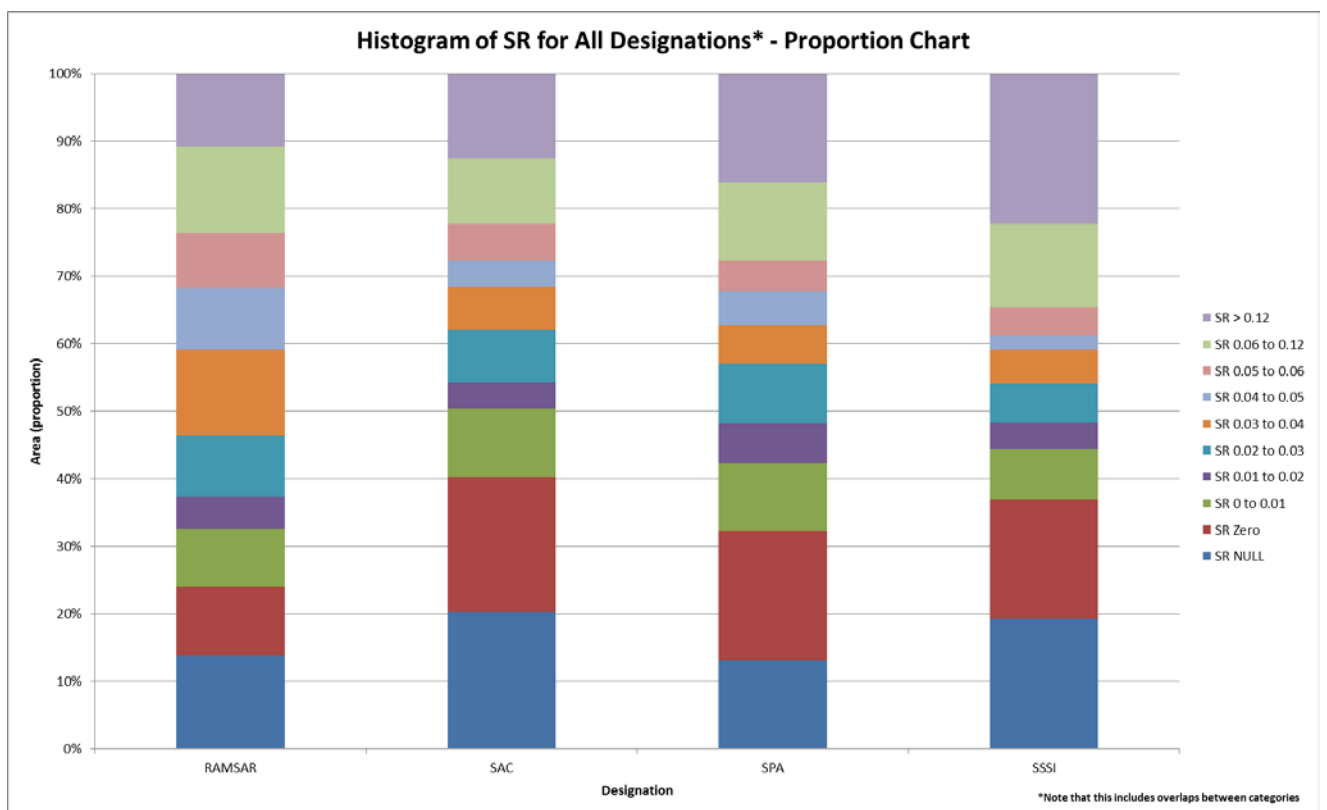


Figure 11: Histogram of SR for all Designations\* - Proportion Chart

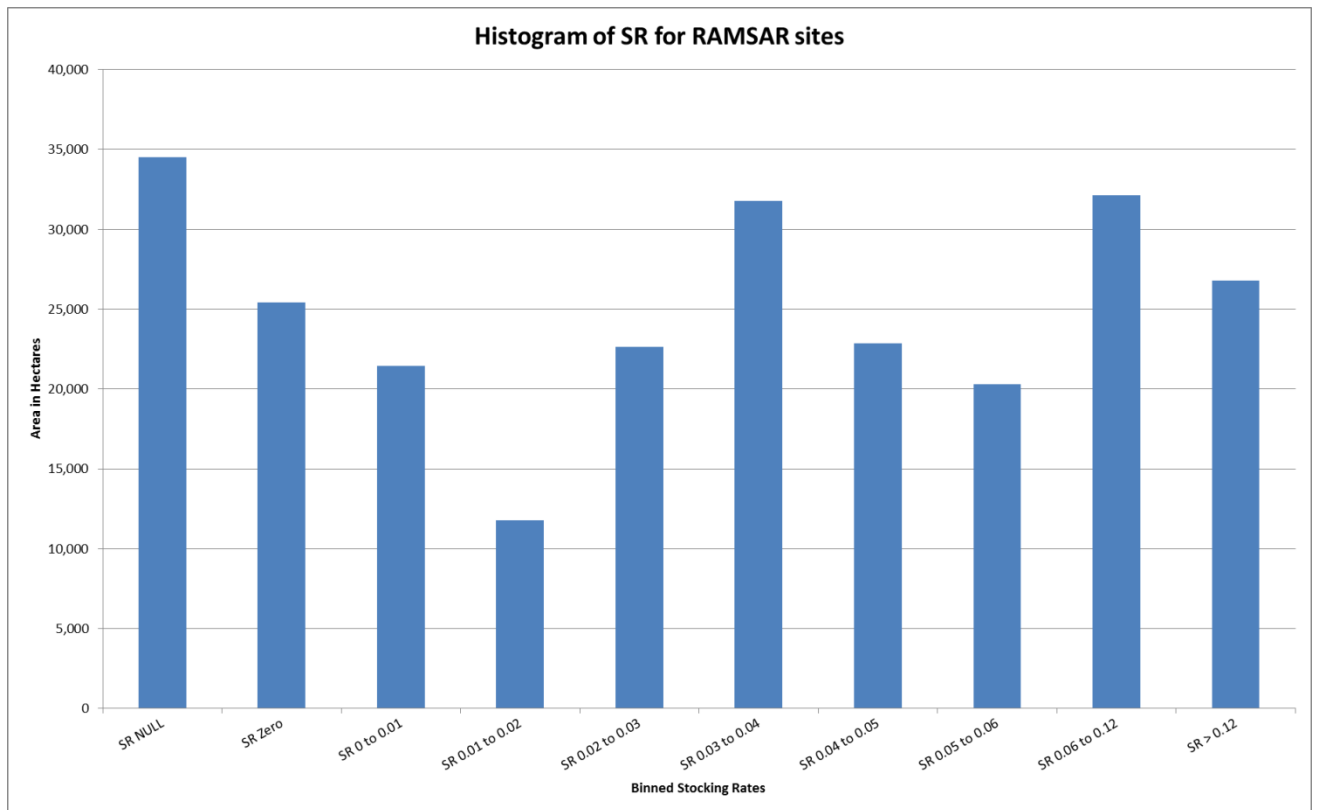


Figure 12: Histogram of SR for RAMSAR sites

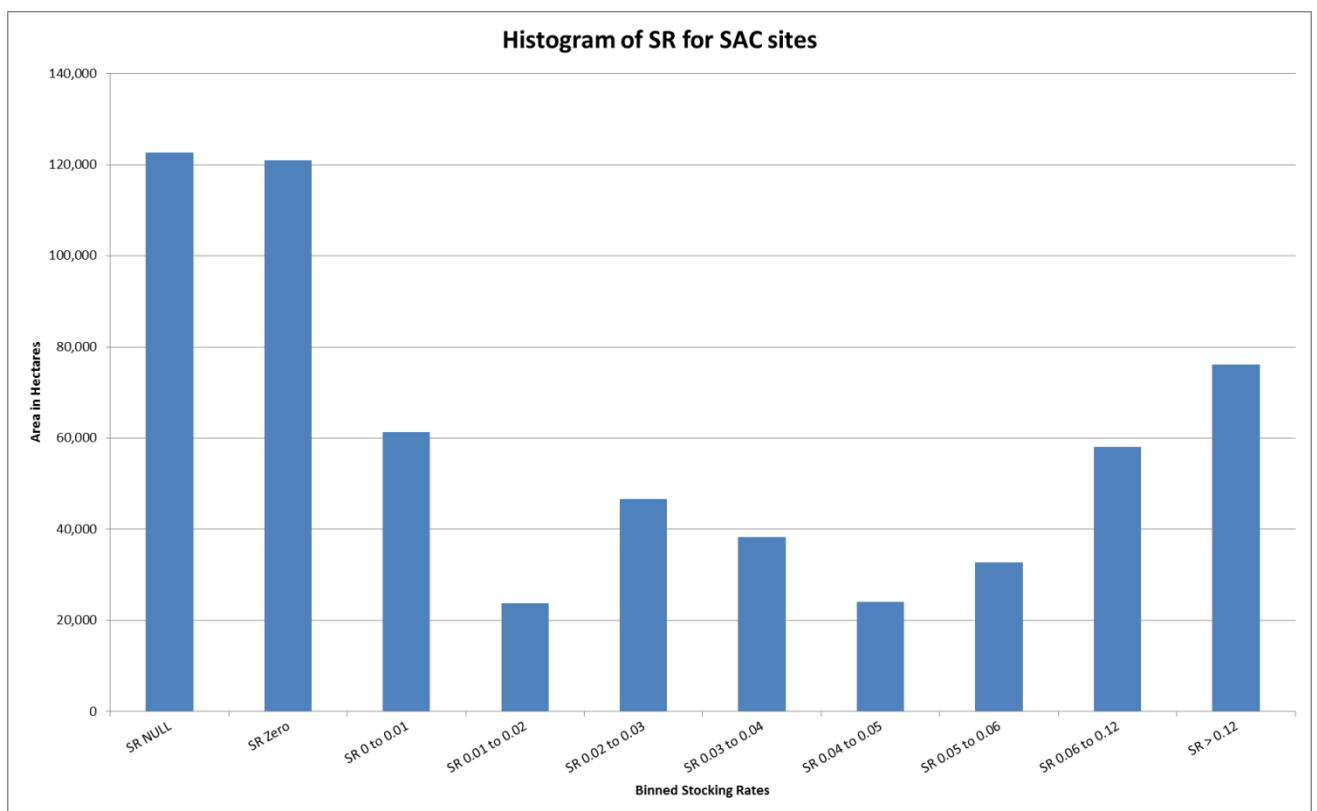


Figure 13: Histogram of SR for SAC sites

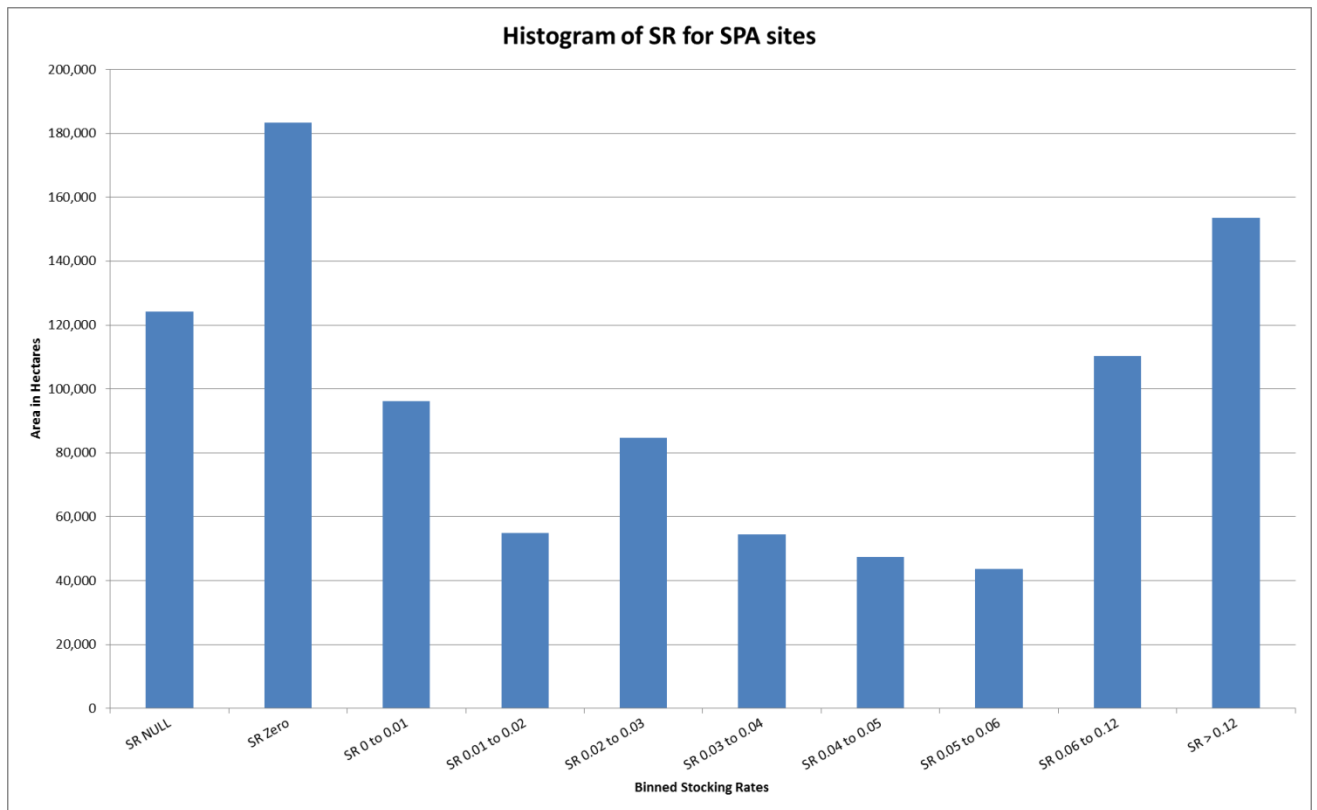


Figure 14: Histogram of SR for SPA sites

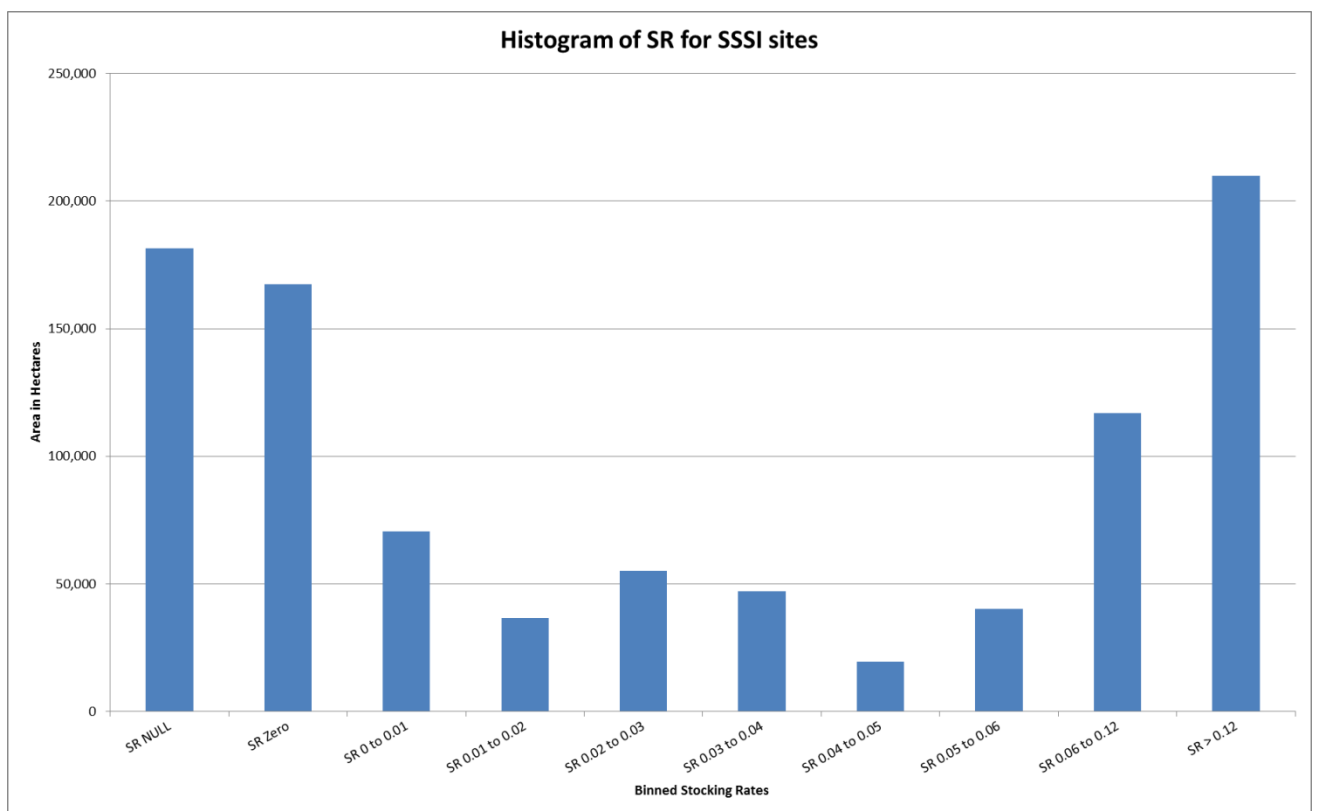


Figure 15: Histogram of SR for SSSI sites



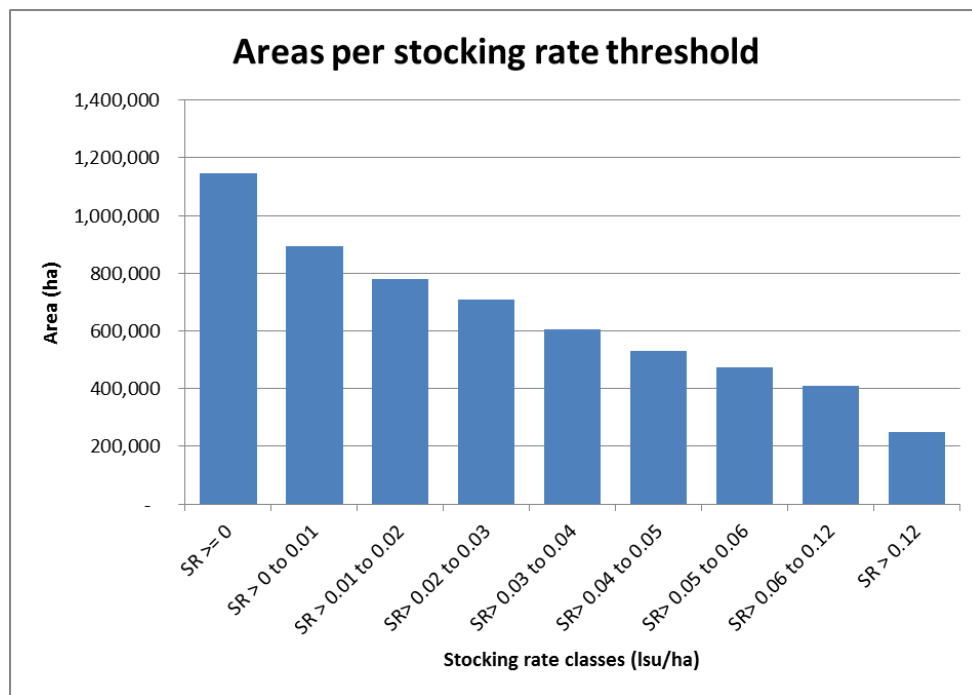


Figure 16: Summary of the areas of sites with environmental designations that would be included depending on the threshold chosen (note SR=Null areas excluded).